

Method and system for notification

Field of the Invention

The invention refers to a method and a system for notifying calls from first
5 terminals to temporarily inaccessible second terminals.

Background of the Invention

When a first terminal sets up, via a telecommunication network, a call to a
second terminal connected to the network, the second terminal's user may not
10 answer ("pick up") to the call for some reason. In that case the unanswered call
may be notified to the second terminal's user by registering, by the second
terminal itself, the identity of the first terminal trying to call the second terminal.
The identity to be registered in an "unanswered calls" list may comprise the
relevant first terminal's "Calling Line Identifier" (CLI) or another relevant terminal
15 or network node identifier or identifier, fit to setup -with minimal user input- a
"reply-call" from the second terminal to the relevant first terminal, written in the
"unanswered calls" list.

However, when the second terminal is unreachable at the moment of the call,
20 e.g. while it is occupied by a connection with another (first) terminal or when it is
disconnected from the network, such an unsuccessful (failed) call -viz. the
relevant terminal or node address or identifier- cannot be listed by the relevant
second terminal and displayed to its user, while the second terminal, at the
moment of the unsuccessful call, is unable to receive and process the relevant
25 first terminal's identifier, while, after all, it cannot be accessed by the first
terminal.

Hereinafter, where applicable, the terms "Calling Line Identifier" and CLI, which
are often used in the domain of (fixed and mobile) telephony, are deemed to
30 have the more general meaning of (calling) terminal or server address or
identifier, or the relevant terminal's or server's (network) node address or node
identifier.

Summary of the Invention

An important aim of the present invention is to provide that unsuccessful calls to a (second) terminal are notified too in the cases in which according to the state-of-the-art notification is impossible.

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The invention comprises a method, a system adapted to perform that method, a notification server forming an important part of the system, and software for controlling the notification server, all complying with the aim of the present invention.

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The method according to the present invention preferably comprises next steps:

- an identifier of an unsuccessfully calling first terminal is derived from the telecommunication network and registered;
- 15 - it is monitored when the second terminal becomes accessible;
- when the second terminal has become accessible the registered identifier of the first terminal is transmitted to the second terminal.

20 The second terminal, after having become accessible, may receive and list the transmitted identifier of the relevant first terminal, enabling e.g. a second terminal's user to call back the relevant first terminal or terminals in a convenient way, making use of the received terminal identifiers, in the same way as the user may call back unanswered calls.

25 Preferably, the identifier of the unsuccessfully calling first terminal is constituted or determined by its calling line identifier (CLI). The second terminal, after having become accessible, may be called using an artificial CLI, having the value of the CLI of the relevant unsuccessfully calling first terminal. In this way the CLI of the relevant first terminal is transmitted to the second terminal
30 using a standard calling (signalling) protocol with CLI forwarding.

Preferably, the call, including the relevant artificial CLI, is aborted as soon as the artificial CLI has been received by the second terminal. In that way the

artificial CLI may be transmitted to the second terminal while avoiding undesired user intervention, viz. call pick up. The only goal of sending an artificial CLI equal to the first terminal's CLI, after all, is to send a replica of the first terminal's CLI, whereupon the second terminal is enabled to list that call into its
5 "unanswered calls" list, thus enabling the second terminal's user to reply to the first terminal's unsuccessful (failed) call as were that call an unanswered call.

Instead of using the first terminal's CLI, use could be made of another terminal or network node identifier or address, e.g. the terminal's Universal Unique
10 Identifier (UUID), (fixed) IP address, International Mobile User Number (IMUN), etc. In those cases, the second terminal, after having become accessible, may be called using an (artificial) identifier (UUID, IP address, IMUN), having the value of the identifier of the relevant unsuccessfully calling first terminal, thus transmitting the relevant first terminal's identifier to the second terminal using a
15 standard protocol.

A system for executing the above method may comprise a notification server for notifying unsuccessful calls from first terminals via a telecommunication network
20 to a second terminal which temporarily may be not accessible by said first terminals and/or the telecommunication network, the notification server being fit to register an identifier of such an unsuccessfully calling first terminal and to transmit the identifier to the second terminal after the second terminal has become accessible.

25 The system preferably comprises monitoring means, co-operating with the notification server, for monitoring the accessibility of the second terminal, the notification server, after the second terminal has become accessible, transmitting the registered identifier to the second terminal.

30 Preferably, the notification server is fit to register a calling line identifier of the relevant unsuccessfully calling first terminal and to call, after the second terminal has become accessible, the second terminal, transmitting an artificial

calling line identifier having the value of the calling line identifier of the relevant unsuccessfully calling first terminal, registered by the notification server.

Transmitting said artificial calling line identifier instead of a “standard” calling line identifier enables the second terminal’s user to “reply” to that artificial calling line identifier and thus setup a call to the relevant first terminal in a convenient, user-friendly way, without any modification of the first terminal’s hardware or software, viz. using the terminal’s “reply to unanswered calls” capability.

10 **Figures**

Figure 1 shows a first embodiment of the invention, comprising a notification server within the domain of the telecommunication network.

Figure 2 shows a second embodiment of the invention, comprising a notification server located outside the telecommunication network but linked to it from another network.

Detailed Description of the Drawings

Figure 1 shows first terminals 1, a telecommunication network 2 (including base stations 3) and a second terminal 4 which temporarily may be not accessible by the first terminals 1 and/or the telecommunication network 2. The network 2 comprises a notification server 6 which is fit for notifying unsuccessful calls to the second terminal 4.

The notification server 6 is linked to a telecommunication network signalling and/or control system, including a monitoring function, represented by a ‘Terminal Registration System’ (TRS) 5 (e.g. may incorporate a Home Location Register (HLR), ‘Visiting Location Registers’ (VLRs), Mobile Switching Centers (MSCs) etc.) The TRS 5 enables the notification server 6 to know (monitor, detect) when the second terminal 4 is accessible or is inaccessible to the telecommunication network and the connected (first) terminals 1. The notification server 6 comprises a register 7 for registering the identifier, e.g. the CLI of each first terminal 1 that unsuccessfully –due to failing access- calls second terminal 4.

The notification server 6 –linked to the TRS 5- is enabled to transmit the identifier of each unsuccessfully calling first terminal from register 7 to the second terminal 4 when, preferably as soon as, -detected via the TRS 5- the second terminal has become accessible.

The notification server 6, after the second terminal 4 has become accessible, calls, e.g. apart for each registered unsuccessfully calling first terminal 1, the second terminal 4 while transmitting –instead of the notification server's own CLI- an artificial CLI, to which the value of the calling line identifier of the relevant unsuccessfully calling first terminal has been assigned by the notification server 6. To this end, the notification server 6 comprises control software which replaces the originating CLI (viz. the server's calling node CLI) by an artificial CLI, which is read from the server's register 7. By doing so, the second terminal 4, called by the notification server 6, will not detect and list the notification server's CLI but, instead, the CLI read from the register 7, which is equal to the CLI of the relevant first terminal 1 which failed to set-up a call to the second terminal 4 before.

Preferably, the notification server 6 aborts the call to the second terminal 4 as soon as the artificial CLI has been transmitted to the second terminal, preventing incurring call setup charges and undesired call pick-up by the second terminal's user, which item will be discussed below more in detail.

Figure 2 shows an embodiment wherein the notification server 6 is connected to another network 8, e.g. the internet. The notification server 6 is linked now to the TRS 5 via the internet 8 and a internet/telephony network gateway 9, e.g. as described in patent application EP2079379, filed by the applicant before, enabling internet based servers to interact with telephony network elements like the TRS 5.

Below the operation of the system shown in figure 2 will be outlined more in detail.

At a certain moment, the user of one of the terminals 1 desires to setup a call to terminal 4 by keying in the telephone number of terminal 4 e.g. 0653724444.

The call, however, may fail while terminal 4 is e.g. disconnected from the

5 network by the terminal's user, not reachable by the network 2 due to bad field strength, or busy by a connection with another terminal 1. In all those cases the telephone number (CLI), e.g. 0619171111 of the originating terminal 1 cannot be listed locally by the unsuccessfully called terminal 4. If a call is setup to terminal 4, this is controlled by the TRS 5. The TRS 5 is aware of the status of
10 terminal 4. So in this case, the TRS 5 doesnot make a connection to terminal 4, while terminal 4 cannot be reached at that moment. TRS 5, however, is able to read and register the telephone number of the "target" terminal 4 (0653724444) and the telephone number or CLI (0619171111) of originating (calling) terminal 1 and keeps track of the accessibility status of terminal 4.

15 The notification server 6 is linked with the TRS 5, in this figure 2 via the internet 8 and the internet/telephony network gateway 9. The notification server 6 is able to derive, from the TRS 5, the CLI (0619171111) of calling terminal 1, the CLI (0653724444) of target terminal 4 and the accessibility status of the
20 unsuccessfully called terminal 4.

As soon as the terminal 4 becomes accessible –because the connection with the other terminal 1 ends, or because the user of terminal 4 reconnects to the network 2 again- this is detected by the TRS 5. At that moment –or some time
25 after that- this accessibility status change of terminal 4 is forwarded to the notification server 6, accompanied with the telephone number or CLI of originating terminal 1 (0619171111) and the telephone number or CLI of destination terminal 4 (0653724444). Based on these CLI values the notification server 6 arranges –via the gateway 9- that, after the terminal 4has become
30 accessible again, a new call is setup to the terminal 4.

Normally, the CLI of the notification server 6 itself would be transmitted to terminal 4, indicating the identifier (telephone number) of the originator of this

new call, and the notification server's CLI would be listed at the called terminal 4. However, the notification server comprises a CLI conversion software module which, before activating the new call to the terminal 4, replaces its own CLI (e.g. 0800567890) by the CLI value of the originally unsuccessful call originator, terminal 1. Consequently, after having been triggered by the TRS 5, the notification server 6 initiates a call to the telephone address 0653724444 of the newly accessible terminal 4, while transmitting, as artificial originating CLI value the value 0619171111 (terminal 1) instead of 0800567890 (notification server 6).

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This action results in an activation of terminal 4 which is called by the notification server 6, receiving, from notification server 6, a call signal which includes the artificial originating CLI value 0619171111 of terminal 1.

15 If the user of terminal 4 would pick up the telephone immediately, he/she would be connected to the notification server 6, which would have no sense. The only aim for the notification server 6 making a call to terminal 4 is to send the CLI value 0619171111 (terminal 1) to terminal 4. To prevent that the user of terminal 4 picks up the call, the notification server 6 aborts the call to the terminal 4 as soon as the artificial CLI (0619171111) has been transmitted to terminal 4. So, notification server 6 calls terminal 4 using artificial CLI 0619171111 and subsequently aborts the call immediately. The effect is that terminal 4 receives a call with CLI 0619171111, which call –while it is aborted before the user responds- will be registered within terminal 4 in the terminal's "list of unanswered calls", which is a standard feature of many modern telephone terminals. In this way the notification server enables that the CLI 0619171111 of terminal 1 –which CLI normally would not be listed in terminal 4- now is picked up by the notification server 6 and –as soon as terminal 4 comes accessible- is forwarded to terminal 4 and written into its list of unanswered calls, thus enabling that the user of terminal 4 may call the caller(s) written in the terminal's list of unanswered calls in a trice.

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